

Direct Push Mobile Technology Used for Real-Time Determination of Volatile Organic Compounds in Groundwater and Soil

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Environmental Issue

Conducting the analysis of VOCs (volatile organic compounds) contained in contaminated soils and groundwater in the field has many advantages. The greatest advantage is the ability to provide real-time field analysis that can be used to determine if the contamination poses a potential threat to residents located near the proximity of the plume.

Contaminated groundwater, as a result of spills or buried materials, is a danger to residents who use well water as their source of drinking water. In addition, the groundwater provides a conduit for spreading the contamination over a larger area, possibly under homes and other buildings. The VOCs contained in the contaminated groundwater plume then have the potential to migrate through the soil and into the homes and buildings above the plume. This migration of VOCs through the soil into buildings is called vapor intrusion and is a growing health concern.

Scientific Approach

SESD Region 4 is pursuing recent technological advances in direct push technology that provide a mechanism of hydraulically pushing a probe through the soil to locate a zone of contamination either in soil or groundwater. The probe, which has a heated permeable membrane, permits transfer of VOCs from the groundwater or soil to a carrier gas circulating through the probe. The carrier gas containing the VOCs is transferred to a detector that is used to measure the total concentration of all VOCs present at the sampling depth.

Simultaneously, the probe measures the electrical conductivity of the soil as it is advanced. The conductivity is used as an indicator of the probable soil types at the same time the VOC analysis is conducted. Soil type characterization is useful in determining potential migration pathways that contaminants may follow.

Partnerships

This technology will be used in U.S. Environmental Protection Agency (U.S. EPA) Region 4 in

partnership with federal, state, and local agencies for ascertaining the VOC concentrations in both soil and contaminated groundwater that may threaten public health and safety.

Impact of U.S. EPA Science

This state-of-the-art technology is a screening tool that can be used to locate underground VOC contamination, which will enhance the Agency's ability to determine potential health hazards associated with drinking water and vapor intrusion.